

MILITARY SPECIFICATION

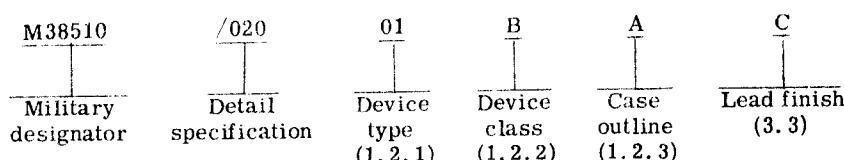
MICROCIRCUITS, DIGITAL, TTL,
LOW POWER, NAND GATES, MONOLITHIC SILICON

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, TTL, low power positive NAND logic gating microcircuits. Three product assurance classes and a choice of case outline/lead finish are provided for each type and are reflected in the complete part number.

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device type. The device type shall be as follows:

<u>Device type</u>	<u>Circuit</u>
01	Single, 8-input positive NAND gate
02	Dual, 4-input positive NAND gate
03	Triple, 3-input positive NAND gate
04	Quadruple, 2-input positive NAND gate
05	Hex, 1-input inverter gate
06	Quadruple, 2-input positive NAND gate (open collector output)

1.2.2 Device class. The device class shall be the product assurance level as defined in MIL-M-38510.

1.2.3 Case outline. The case outline shall be designated as follows:

<u>Letter</u>	<u>Case outline, MIL-M-38510, Appendix C</u>
A	- F-1 (14-pin, 1/4" x 1/4" flat pack)
B	- F-3 (14-pin, 1/8" x 1/4" flat pack)
C	- D-1 (14-pin, 1/4" x 3/4" dual-in-line pack)
D	- F-2 (14-pin, 1/4" x 3/8" flat pack)

1.3 Absolute maximum ratings:

Supply voltage range - - - - - 0 Vdc to 8.0 Vdc
Input voltage range - - - - - 0 Vdc to 6.0 Vdc
Storage temperature range - - - - - -65° C to 150° C
Maximum power dissipation, P_D 1/ - - - - 4 mWdc per gate
Lead temperature (soldering 10 seconds) - - - 300° C
Thermal resistance, junction to case - - - $\theta_{JC} = \begin{cases} 0.09^\circ \text{C/mW} & \text{for flat pack} \\ 0.08^\circ \text{C/mW} & \text{for dual-in-line pack} \end{cases}$
Junction temperature - - - - - $T_J = 175^\circ \text{C}$

1.4 Recommended operating conditions:

Supply voltage - - - - - 4.5 Vdc minimum to 5.5 Vdc maximum
Minimum high level input voltage - - - - - 2.0 Vdc
Maximum low level input voltage - - - - - 0.7 Vdc
Normalized fanout (each output) 2/ - - - - 10 maximum
Ambient operating temperature range - - - - - -55° C to 125° C

2. APPLICABLE DOCUMENT

2.1 The following document, of the issue in effect on date of invitation for bids or request for proposal, forms a part of this specification to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Detail specifications. The individual item requirements shall be in accordance with MIL-M-38510, and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510, and herein.

3.2.1 Logic diagram and terminal connections. The logic diagram and terminal connections shall be as specified on figure 1.

3.2.2 Truth tables and logic equations. The truth tables and logic equations shall be as specified on figure 2.

3.2.3 Schematic circuit. The schematic circuit shall be as specified on figure 3.

3.2.4 Case outlines. The case outlines shall be in accordance with 1.2.3.

3.3 Lead material and finish. Lead material and finish shall be in accordance with MIL-M-38510.

1/ Must withstand the added P_D due to short circuit conditions (e.g., I_{OS}) at one output for 5 seconds duration.

2/ Device will fanout in both high and low levels to the specified number of inputs of the same device type as that being tested.

3.4 Electrical performance characteristics. The electrical performance characteristics are as specified in table I and apply over the full recommended ambient operating temperature range, unless otherwise specified.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions	Device type	Limits		
				Min	Max	Units
High-level output voltage (except open collector output circuits)	V _{OH}	V _{CC} = 4.5V, V _{IN} = 0.7V I _{OH} = -100 μA ^{1/}	01, 02, 03, 04, 05	2.4	---	Volts
Low-level output voltage	V _{OL}	V _{CC} = 4.5V, I _{OL} = 2 mA V _{IN} = 2.0V for all inputs of gate under test ^{1/}	All		0.3	Volts
Maximum collector cut-off current (open collector circuits only)	I _{CEx}	V _{CC} = 4.5V, V _{IN} = 0.6V V _{OH} = 5.5V	06		50	μA
High-level input current	I _{IH1}	V _{CC} = 5.5V, V _{IN} = 2.4V ^{2/}	All		10	μA
High-level input current	I _{IH2}	V _{CC} = 5.5V, V _{IN} = 5.5V ^{2/}	All		100	μA
Low-level input current	I _{IL}	V _{CC} = 5.5V, V _{IN} = 0.3V ^{1/}	All	-60	-180	μA
Short-circuit output current (except open collector circuits)	I _{OS}	V _{CC} = 5.5V ^{2/} ^{3/}	01, 02, 03, 04, 05	-3	-15	mA
High-level supply current per gate	I _{ICCH}	V _{CC} = 5.5V ^{2/} V _{IN} = 0V	02, 03, 04, 05, 06 01		200	μA
Low-level supply current per gate	I _{ICCL}	V _{CC} = 5.5V ^{1/} V _{IN} = 5.5V	All		330	μA
Propagation delay time, high-to-low-level	t _{PHL}	C _L = 50 pF, R _L = 4KΩ		01	3	140 ns
				02, 03, 04, 05, 06	3	90 ns
Propagation delay time, low-to-high-level	t _{TPLH}	C _L = 50 pF, R _L = 4KΩ		01, 02, 03, 04, 05	3	90 ns
				06	3	140 ns

^{1/} All unspecified inputs at 5.5 volts.

^{2/} All unspecified inputs grounded.

^{3/} Not more than one output should be shorted at a time.

2.5 Rebonding. Rebonding shall be in accordance with MIL-M-38510.

3.6 Electrical test requirements. Electrical test requirements shall be as specified in table III for the applicable device type and device class. The subgroups of table III which constitute the minimum electrical test requirements for screening, qualification, and quality conformance by device class are specified in table II.

3.7 Marking. Marking shall be in accordance with MIL-M-38510 and 1.2. At the option of the manufacturer, the following marking may be omitted from the body of the microcircuit, but shall be retained on the initial container:

- (a) Country of origin.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirement	Subgroups (see table III)		
	Class A devices	Class B devices	Class C devices
Interim electrical parameters (pre burn-in) (Method 5004)	1	1	None
Final electrical test parameters (Method 5004)	1*, 2, 3, 9	1*, 2, 3, 9	1
Group A test requirements (Method 5005)	1, 2, 3, 9, 10, 11	1, 2, 3, 9	1, 2, 3, 9
Groups B and C end point electrical parameters (Method 5005)	1, 2, 3	1, 2, 3	1
Additional electrical subgroups for group C periodic inspections	None	10, 11	None

4. PRODUCT ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and Method 5005 of MIL-STD-883, except as modified herein.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-M-38510. Inspections to be performed shall be those specified herein for groups A, B, and C inspections (see 4.4.1, 4.4.2, and 4.4.3). After qualification of one or more electrically and structurally similar types with a single lead finish, other lead finishes of the same case outline may be qualified by submitting a single type in the qualified case outline to the group B, subgroup 3 test and the group C, subgroups 1, 3, and 4 tests.

4.3 Screening. Screening shall be in accordance with Method 5004 of MIL-STD-883, and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

- (a) Test samples for the group B bond strength test specified in Method 5005 of MIL-STD-883 may, at the manufacturer's option, be randomly selected immediately following the internal visual (precap) inspection and prior to sealing (see 4.4.2(b)).
- (b) Temperature cycling (Method 1010 of MIL-STD-883).
 - (1) Omit seal test as post-test measurement.
- (c) Thermal shock (Method 1011 of MIL-STD-883), when substituted for temperature cycling.
 - (1) Omit seal test as post-test measurement.
- (d) Burn-in test (Method 1015 of MIL-STD-883).
 - (1) Test condition D or E, using the circuit shown on figure 4, or equivalent.
 - (2) $T_A = 125^\circ\text{C}$ minimum.
- (e) Reverse bias burn-in and interim electrical test in accordance with 3.1.10 of Method 5004 of MIL-STD-883 may be omitted.
- (f) Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.
- (g) External visual inspection shall not include measurement of case and lead dimensions.
- (h) Percent defective allowable (PDA) - The PDA is specified as 5 percent for class A devices and 10 percent for class B devices based on failures from group A, subgroup 1 test after cooldown as final electrical test in accordance with Method 5004 of MIL-STD-883, and with no intervening electrical measurements. If interim electrical parameter tests are performed prior to burn-in, failures resulting from pre burn-in screening may be excluded from the PDA. If interim electrical parameter tests prior to burn-in are omitted, then all screening failures shall be included in the PDA.

The verified failures of group A, subgroup 1 after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent defective for the lot, and the lot shall be accepted or rejected based on the PDA for the applicable device class.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510.

4.4.1 Group A inspection. Group A inspection shall consist of the test subgroups and LTPD values shown in table I of Method 5005 of MIL-STD-883 and as follows:

- (a) Tests shall be as specified in table II.
- (b) Subgroups 4, 5, 6, 7, and 8 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall consist of the test subgroups and LTPD values shown in table II of Method 5005 of MIL-STD-883 and as follows:

- (a) End point electrical parameters shall be as specified in table II.
- (b) Bond strength test may be conducted on samples collected prior to sealing (see 4.3(a)).

4.4.3 Group C inspection. Group C inspection shall consist of the test subgroups and LTPD values shown in table III of Method 5005 of MIL-STD-883 and as follows:

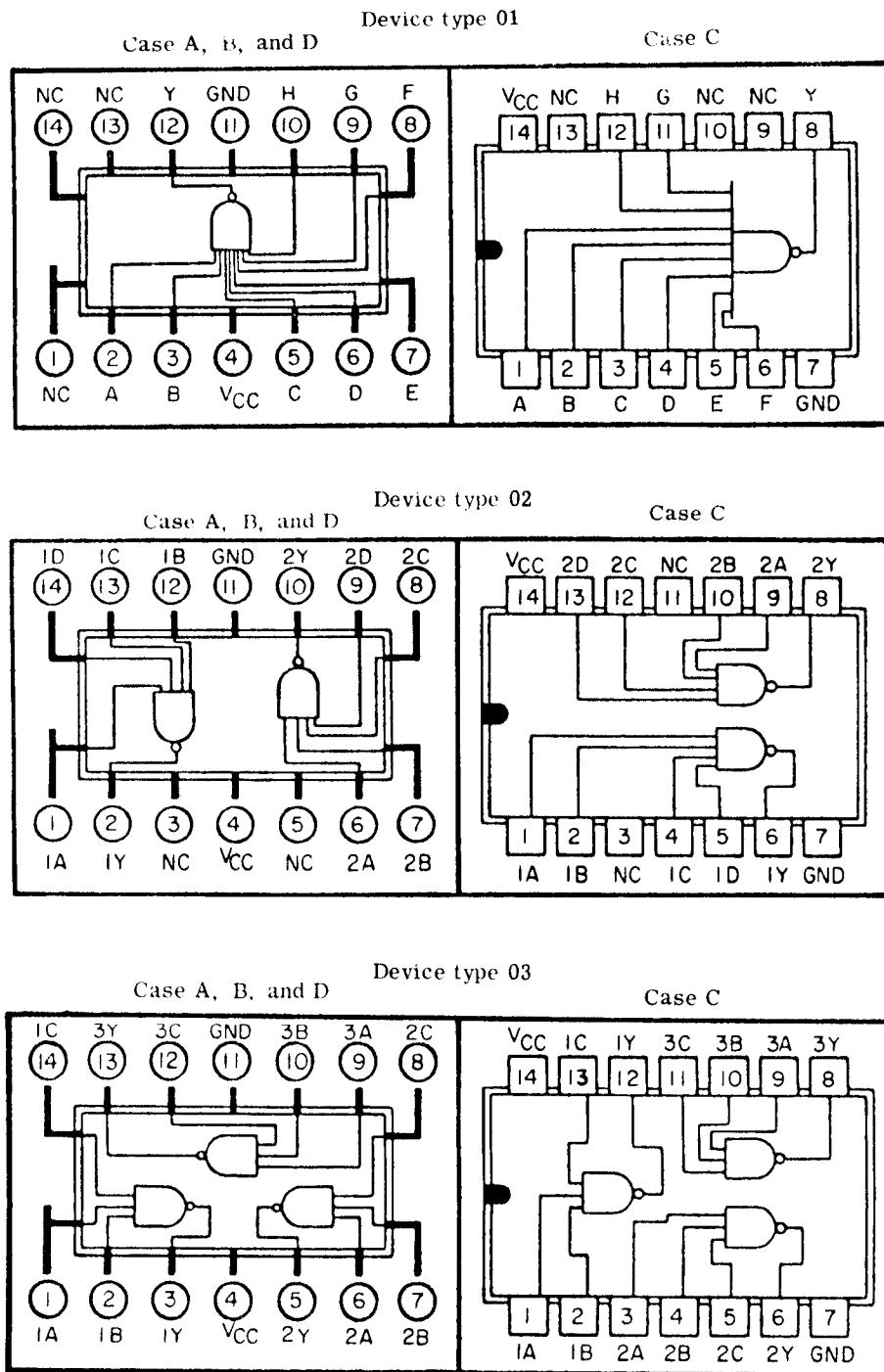
- (a) End point electrical parameters shall be as specified in table II.
- (b) Subgroups 7 and 8 shall be added to the group C inspection requirements for class B devices and shall consist of the tests, conditions, and limits specified for subgroups 10 and 11 of group A.
- (c) Lead bend in only one direction is required for initial conditioning prior to moisture resistance and salt atmosphere tests.
- (d) High temperature storage test (Method 1008 of MIL-STD-883) conditions:
 - (1) Temperature: $150 \pm 10^\circ\text{C}$.
 - (2) Duration: 1,000 hours, except as otherwise permitted by Appendix B of MIL-M-38510.
- (e) Operating life test (Method 1005 of MIL-STD-883) conditions:
 - (1) Test condition D or E, using the circuit shown on figure 4, or equivalent.
 - (2) $T_A = 125^\circ\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by Appendix B of MIL-M-38510.
- (f) Omit steady state reverse bias test.

4.5 Methods of examination and test. Methods of examination and test shall be as specified in the appropriate tables and as follows.

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional current and positive when flowing into the referenced terminal.

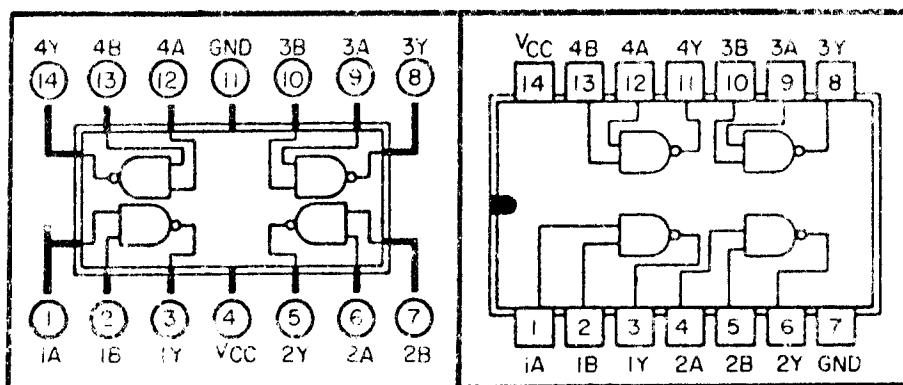
4.5.2 Life test cooldown procedure. When devices are measured at 25°C following application of the operating life or burn-in test condition, they shall be cooled to room temperature prior to removal of the bias. Alternately, the bias may be removed during cooling if the case temperature is reduced to room temperature within 30 minutes after removal of the test condition.

4.6 Inspection of preparation for delivery. Inspection of preparation for delivery shall be in accordance with MIL-M-38510, except that the rough handling test shall not apply.

FIGURE 1. Logic diagrams and terminal connections (Top Views)

* Device types 04 and 06

Case A, B, and D

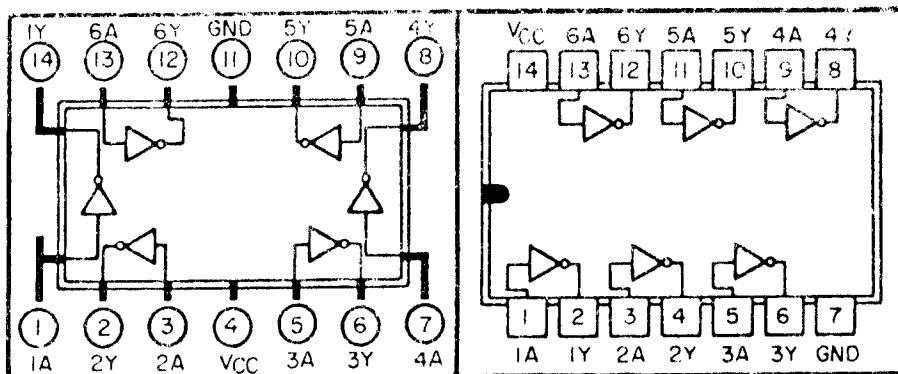


Case C

* Device type 06 in accordance with "Case C" only.

Device type 05

Case A, B, and D



Case C

FIGURE 1. Logic diagram and terminal connections (Top Views) - Continued.

Device type 01

Truth table								
Input								Output
A	B	C	D	E	F	G	H	Y
H	H	H	H	H	H	H	H	L
All other combinations of H and L at the inputs give H output.								

Positive logic $Y = \overline{ABCDEFGH}$

Device type 05

Truth table each gate	
Input	Output
A	Y
L	H
H	L

Positive logic $Y = \overline{A}$

Device type 03

Truth table			
Input			Output
A	B	C	Y
L	L	L	H
H	L	L	H
L	H	L	H
H	H	L	H
L	L	H	H
H	L	H	H
L	H	H	H
H	H	H	H
L	H	H	H
H	H	H	L

Positive logic $Y = \overline{ABC}$

Device type 02

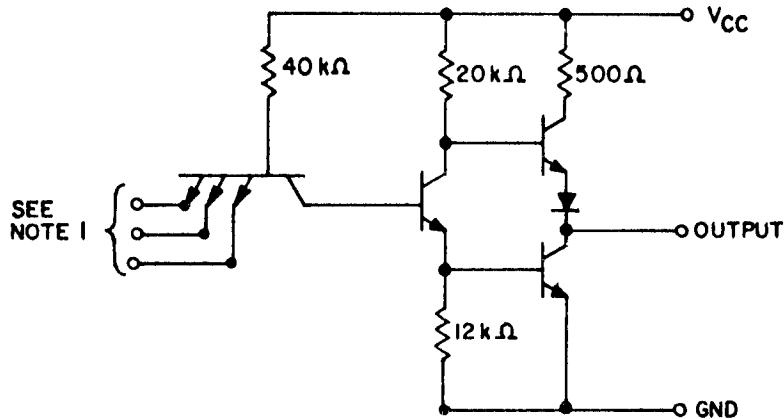
Truth table				
Input				Output
A	B	C	D	Y
L	L	L	L	H
H	L	L	L	H
L	H	L	L	H
H	H	L	L	H
L	L	H	L	H
H	L	H	L	H
H	L	H	L	H
L	H	H	L	H
H	H	H	L	H
L	L	H	H	H
H	L	L	H	H
L	H	L	H	H
H	H	L	H	H
L	L	H	H	H
H	L	H	H	H
L	H	H	H	H
H	H	H	H	L

Positive logic $Y = \overline{ABCD}$

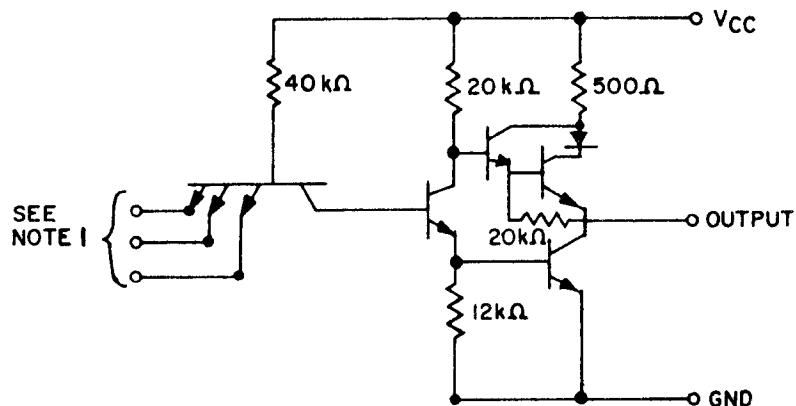
Device types 04 and 06

Truth table each gate	
Input	Output
A	Y
L	L
H	H
L	H
H	L

Positive logic $Y = \overline{AB}$ FIGURE 2. Truth tables and logic equations.

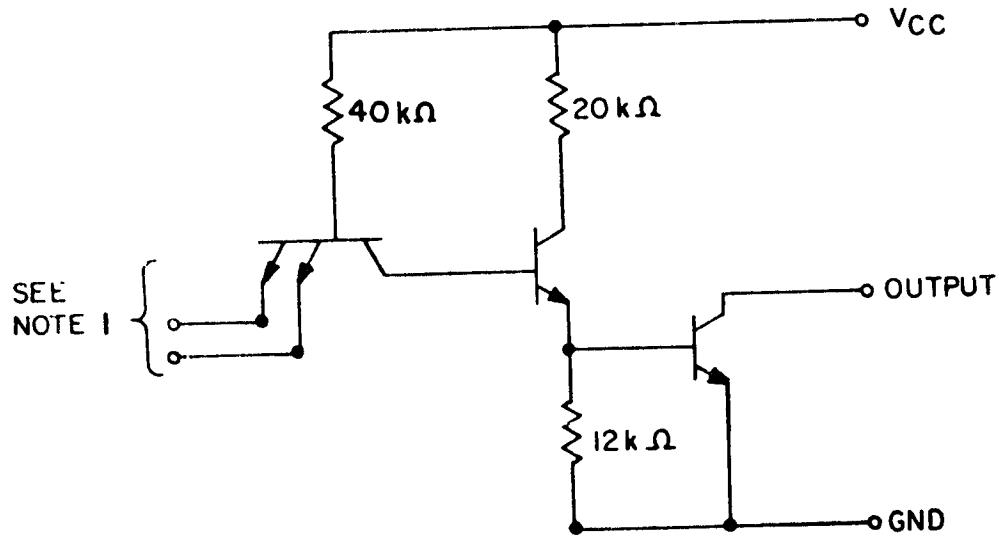


SCHEMATIC A



SCHEMATIC B

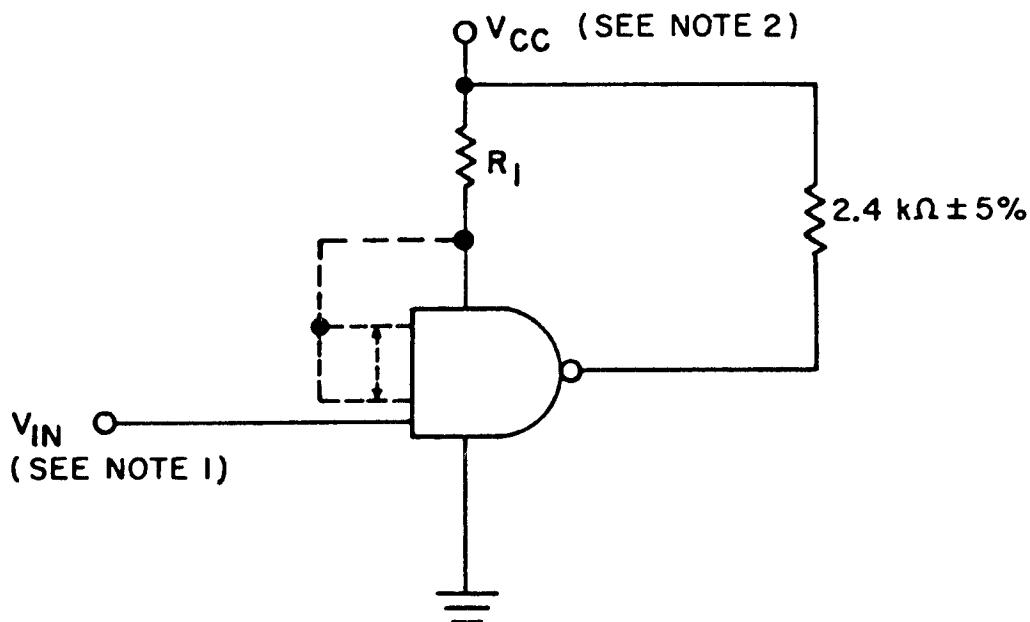
FIGURE 3. Schematic circuit for device types 01, 02, 03, 04 and 05.



NOTES:

1. Number of inputs is determined by logic configuration shown in figure 1.
2. All resistance values shown are nominal.

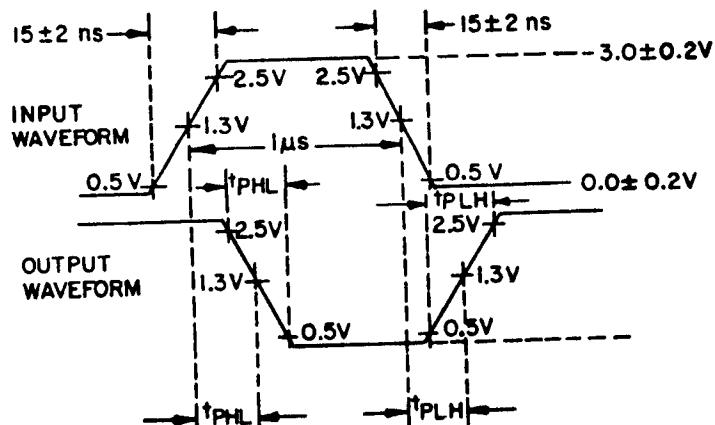
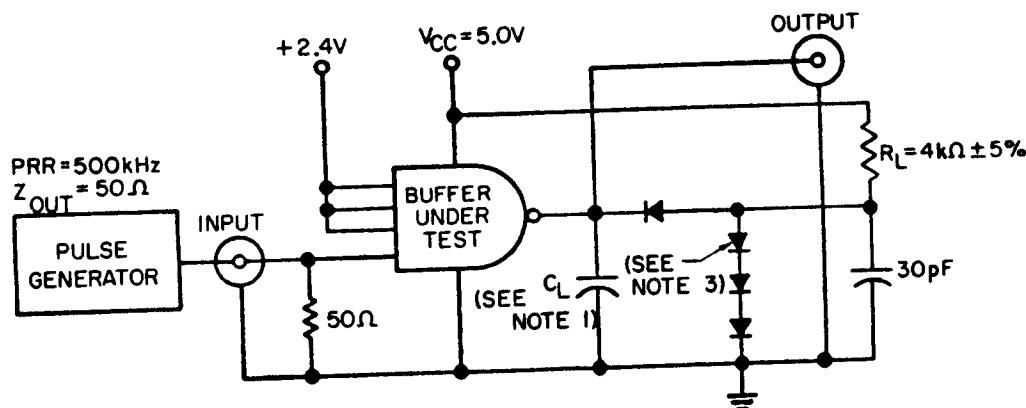
FIGURE 3. Schematic circuit for device type 06-Continued.



NOTES:

1. One input of each gate shall be driven. The remaining inputs of each gate shall be connected to V_{CC} through the appropriate current limiting resistors.
2. V_{CC} and R_1 are such that the minimum voltage at the device terminals is 5 volts.
3. If parallel excitation is used, the clock frequency shall be 100kHz with $V_{IN} = 3$ volts minimum and maximum duty cycle of 50%.

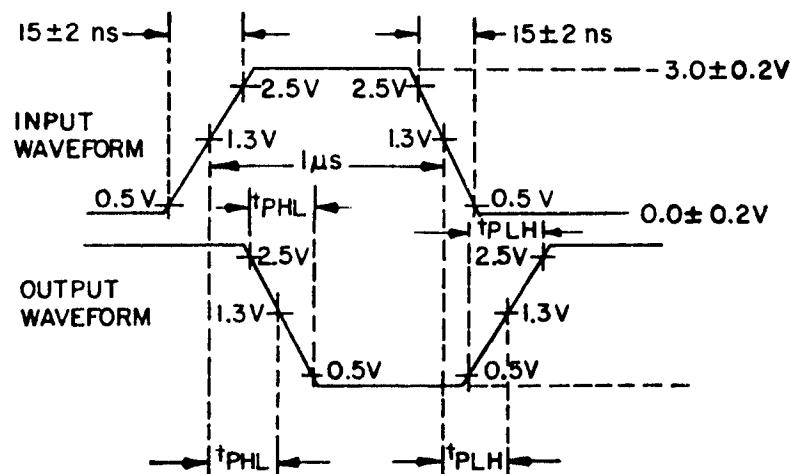
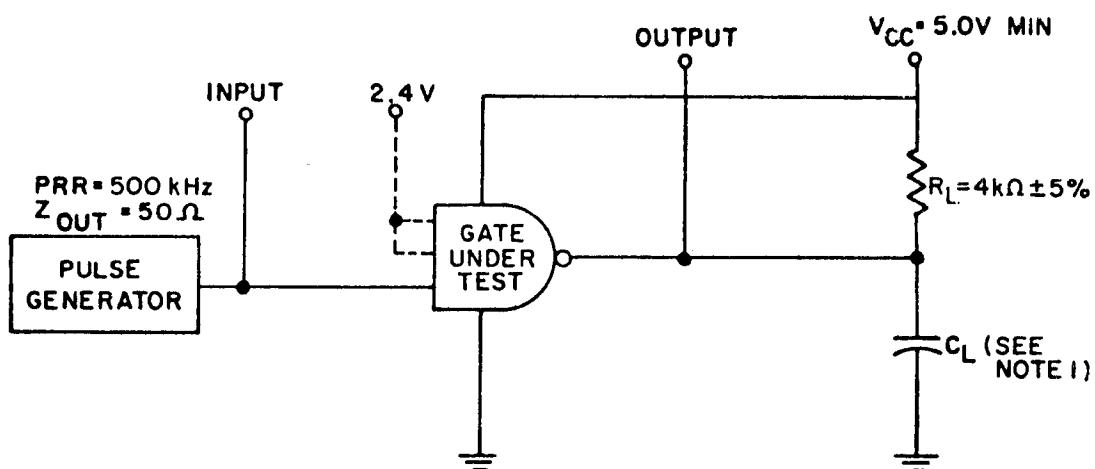
FIGURE 4. Burn-in and life test circuit.



NOTES:

1. $C_L = 50\text{pF}$ minimum, including scope probe, wiring, and stray capacitance, without package in test fixture.
2. Voltage measurements are to be made with respect to network ground terminal.
3. All diodes are 1N3064 or equivalent.

FIGURE 5. Switching time test circuit except for open collector circuits
(types 01, 02, 03, 04, and 05).



NOTES:

1. $C_L = 50\text{pF}$ minimum, including scope probe, wiring, and stray capacitance, without package in test fixture.
2. Voltage measurements are to be made with respect to network ground terminal.

FIGURE 6. Switching time test circuit (type 06).

TABLE III. Group A inspection for device type 01.
Terminal conditions (pins not designated are open)

Subgroup	Symbol	MIL-STD-883	Test No.	Meas. terminal												Test limits			
				Case A, B, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Unit
1 $T_A = 25^\circ C$	VOL	3007	1	2.0 v	2.0 v	4.5 v	2.0 v	2 mA	100 μA	Y	2.4 v								
	VCH	3006	2	6.7 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	Y	Y	Y
		3	5.5 v	0.7 v	5.5 v	0.7 v	5.5 v	0.7 v	5.5 v	0.7 v	5.5 v	0.7 v	5.5 v	0.7 v	5.5 v	0.7 v	Y	Y	Y
		4															Y	Y	Y
		5															Y	Y	Y
		6															Y	Y	Y
		7															Y	Y	Y
		8															Y	Y	Y
	IOS	3011	9														Y	Y	-3 -15 mA
	I _{H1}	3010	10	GND	GND	5.5 v	GND	Y	Y	10 μA									
2	I _{H2}	19	11	2.4 v	GND	2.4 v	GND	2.4 v	GND	2.4 v	GND	2.4 v	GND	2.4 v	GND	2.4 v	A	B	C
		20	12	5.5 v	GND	5.5 v	GND	5.5 v	GND	5.5 v	GND	5.5 v	GND	5.5 v	GND	5.5 v	D	E	F
		13	14														G	H	H
		15	16																
		17	18																
		19	20	5.5 v	GND	5.5 v	GND	5.5 v	GND	5.5 v	GND	5.5 v	GND	5.5 v	GND	5.5 v	A	B	C
		21	22														D	E	F
		23	24														G	H	H
		25	26																
		27	28	0.3 v	5.5 v	0.3 v	5.5 v	0.3 v	5.5 v	0.3 v	5.5 v	0.3 v	5.5 v	0.3 v	5.5 v	0.3 v	A	B	C
3	IIL	3009	29	30	31	32	33	34	35	36	37	38	39	40	41	42	D	E	F
		31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	G	H	H
		32	33	34	35	36	37	38	39	40	41	42	43	44	45	46			
		33	34	35	36	37	38	39	40	41	42	43	44	45	46	47			
		34	35	36	37	38	39	40	41	42	43	44	45	46	47	48			
		35	36	37	38	39	40	41	42	43	44	45	46	47	48	49			
		36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			
		37	38	39	40	41	42	43	44	45	46	47	48	49	50	51			
		38	39	40	41	42	43	44	45	46	47	48	49	50	51	52			
		39	40	41	42	43	44	45	46	47	48	49	50	51	52	53			
4	ICCL	3006	35	36	37	38	39	40	41	42	43	44	45	46	47	48	VCC	0.51 mA	
	ICCH	3005															VCC	0.33 mA	
5																			
6																			
7																			
8																			
9	tPHL	3003	37	38	39	40	41	42	43	44	45	46	47	48	49	50	ns		
10	tPHL	(Fig. 5)	37	38	39	40	41	42	43	44	45	46	47	48	49	50			
11																			

2 Same tests, terminal conditions and limits as for subgroup 1, except $T_A = -55^\circ C$.

3 Same tests, terminal conditions and limits as for subgroup 1, except $T_A = -55^\circ C$.

Subgroup	Symbol	MIL-STD-883	Test No.	Meas. terminal												Test limits			
				Case A, B, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Unit
TA = 25 $^\circ C$																			
TA = 125 $^\circ C$																			
11																			

Same tests, terminal conditions and limits as for subgroup 10, except $T_A = -55^\circ C$.

TABLE III. Group A inspection for device type 02.
Terminal condition (pins not designated are open)

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TABLE III. Group A inspection for device type 02 - Continued.
Terminal conditions (pins not designated are open)

Subgroup	Symbol	MIL-STD-883 method	Case A, B, D				Case C				Test No.				1A				1B				1C				Meas. terminal				Test limits			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	1Y	NC	VCC	NC	2A	2B	2C	2D	2Y	GND	2.4 v	2.4 v	2.4 v	2.4 v	1A to 1Y	1A to 1Y	1A to 1Y	1A to 1Y
9 $T_A = 25^\circ C$	t_{PHL}	3003 (Fig. 5)	39 CKT A 39 CKT B 40 CKT A 40 CKT B	IN IN	OUT OUT	5.0 v					IN IN	2.4 v 2.4 v	2.4 v 2.4 v	OUT OUT																				
	t_{PLH}		41 CKT A 41 CKT B 42 CKT A 42 CKT B	IN IN	OUT OUT					IN IN	2.4 v 2.4 v	2.4 v 2.4 v	OUT OUT																					
10 $T_A = 125^\circ C$	t_{PHL}		43 CKT A 43 CKT B 44 CKT A 44 CKT B	IN IN	OUT OUT					IN IN	2.4 v 2.4 v	2.4 v 2.4 v	OUT OUT																					
	t_{PLH}		45 CKT A 45 CKT B 46 CKT A 46 CKT B	IN IN	OUT OUT					IN IN	2.4 v 2.4 v	2.4 v 2.4 v	OUT OUT																					
11																																		

11 Same tests, terminal conditions and limits as for subgroup 10, except $T_A = -55^\circ C$.

TABLE III. Group A inspection for device type 03.
Terminal conditions (pins not designated are open)

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TABLE III. Group A inspection for device type 03 - Continued.

Subgroup	Symbol	ML-STD-883 method	Test No.	Terminal conditions (pins not designated are open)										Test limits				
				Case A,B,D Case C	1 2	2 12	3 14	4 VCC	5 2Y	6 2B	7 2C	8 3A	9 3B	10 GND	11 3C	12 3Y	13 1C	Meas. terminal
9 $T_A = 25^\circ C$	t_{PHL}	3003 (Fig. 5)	45 CKT A	IN IN	2.4 v 2.4 v	OUT OUT	5.0 v							GND		2.4 v 2.4 v	1A to 1Y 2A to 2Y 2A to 3Y 3A to 3Y	3 60 ns
			45 CKT B	IN IN	2.4 v 2.4 v	OUT OUT												
			46 CKT A															
			46 CKT B															
			47 CKT A															
			47 CKT B															
			48 CKT A	IN IN	2.4 v 2.4 v	OUT OUT												
			48 CKT B	IN IN	2.4 v 2.4 v	OUT OUT												
			49 CKT A															
			49 CKT B															
10 $T_A = 125^\circ C$	t_{PHL}	5003	50 CKT A															
			50 CKT B															
			51 CKT A	IN IN	2.4 v 2.4 v	OUT OUT												
			51 CKT B	IN IN	2.4 v 2.4 v	OUT OUT												
			52 CKT A															
			52 CKT B															
			53 CKT A															
			53 CKT B															
			54 CKT A	IN IN	2.4 v 2.4 v	OUT OUT												
			54 CKT B	IN IN	2.4 v 2.4 v	OUT OUT												
11	t_{PLH}		55 CKT A															
			55 CKT B															
11	t_{PLH}		56 CKT A															
			56 CKT B															

11 Same tests, terminal conditions and limits as for subgroup 10, except $T_A = -55^\circ C$.

TABLE III. Group A inspection for device type 04.

Subgroup	Symbol	MIL-STD-883 method	Case A, B, D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Meas. terminal	Test limits
				Case C	1	2	3	14	6	4	5	8	3Y	3A	3B	GND	4A	4B	
1 $T_A = -25^\circ C$	V_{OL}	3007	1A	2.0 v	2.0 v	2 mA	4.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	5.5 v	0.3 v
	V_{OH}		1	5.5 v	5.5 v	5.5 v	1Y	VCC	2X	2A	2B	3Y	3A	3B	GND	4A	4B	4Y	
		3	2.0 v	5.5 v	5.5 v	5.5 v			2.0 v	5.5 v	5.5 v	2.0 v	5.5 v	2.0 v	5.5 v	5.5 v	5.5 v	5.5 v	
		4	0.7 v	5.5 v	5.5 v	5.5 v			-100 μ A	0.7 v									
		5	0.7 v	5.5 v	5.5 v	5.5 v			-100 μ A	0.7 v									
		6	5.5 v	0.7 v	5.5 v	5.5 v			-100 μ A	0.7 v									
		7	5.5 v	5.5 v	0.7 v	5.5 v			-100 μ A	0.7 v									
		8	5.5 v	5.5 v	5.5 v	0.7 v			-100 μ A	0.7 v									
		9																	
		10																	
		11																	
		12																	
		13																	
		14																	
		15																	
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		37																	
		38																	
		39																	
		40																	
		41																	
		42																	
		3009																	
		3005																	
		3005																	

¹ Same tests, terminal conditions and limits as for subgroup 1, except $T_A = 125^\circ C$.

² Same tests, terminal conditions and limits as for subgroup 1, except $T_A = -55^\circ C$.

³ I_{H1} , I_{H2} , I_{IL} , I_{CCH} , I_{CCL}

TABLE III. Group A inspection for device type 04 - Continued.

Subgroup	Symbol	MIL-STD-883 Method	Case A, B, D		Case C		Terminal conditions (pins not designated are open)		Test limits						
			1	2	3	4	5	6	7	8	9	10	11	12	
9 $T_A = 25^\circ C$	t_{PHL}	3003 (Fig. 5)	43 CKT A 44 CKT B 45 CKT A 45 CKT B 46 CKT A 46 CKT B	IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT	5.0 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	IN IN OUT OUT	IN IN OUT OUT	GND GND IN IN	4A 4B	4Y	4A 4B	4Y	
			47 CKT A 47 CKT B 48 CKT A 48 CKT B 49 CKT A 49 CKT B	IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT	IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT	4A 4A 4A 4A	4Y 4Y 4Y 4Y	50 50 50 50	
			50 CKT A 50 CKT B	IN IN	2.4 v 2.4 v	OUT OUT	2.4 v 2.4 v	OUT OUT	IN IN	2.4 v 2.4 v	OUT OUT	4A 4A	4Y 4Y	50 50	
			51 CKT A 51 CKT B 52 CKT A 52 CKT B 53 CKT A 53 CKT B 54 CKT A 54 CKT B	IN IN IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	IN IN IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	4A 4A 4A 4A 4A 4A 4A 4A	4Y 4Y 4Y 4Y 4Y 4Y 4Y 4Y	50 50 50 50 50 50 50 50	
			55 CKT A 55 CKT B 56 CKT A 56 CKT B 57 CKT A 57 CKT B 58 CKT A 58 CKT B	IN IN IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	IN IN IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	4A 4A 4A 4A 4A 4A 4A 4A	4Y 4Y 4Y 4Y 4Y 4Y 4Y 4Y	55 55 55 55 55 55 55 55	
10 $T_A = 125^\circ C$	t_{PLH}	3003 (Fig. 5)	43 CKT A 44 CKT B 45 CKT A 45 CKT B 46 CKT A 46 CKT B	IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT	5.0 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	IN IN OUT OUT	IN IN OUT OUT	GND GND IN IN	4A 4B	4Y	4A 4B	4Y	50 50 50 50 50 50
			47 CKT A 47 CKT B 48 CKT A 48 CKT B 49 CKT A 49 CKT B	IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT	IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT	4A 4A 4A 4A 4A 4A	4Y 4Y 4Y 4Y 4Y 4Y	50 50 50 50 50 50	
			50 CKT A 50 CKT B	IN IN	2.4 v 2.4 v	OUT OUT	2.4 v 2.4 v	OUT OUT	IN IN	2.4 v 2.4 v	OUT OUT	4A 4A	4Y 4Y	50 50	
			51 CKT A 51 CKT B 52 CKT A 52 CKT B 53 CKT A 53 CKT B 54 CKT A 54 CKT B	IN IN IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	IN IN IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	4A 4A 4A 4A 4A 4A 4A 4A	4Y 4Y 4Y 4Y 4Y 4Y 4Y 4Y	50 50 50 50 50 50 50 50	
			55 CKT A 55 CKT B 56 CKT A 56 CKT B 57 CKT A 57 CKT B 58 CKT A 58 CKT B	IN IN IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	IN IN IN IN IN IN IN IN	2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v 2.4 v	OUT OUT OUT OUT OUT OUT OUT OUT	4A 4A 4A 4A 4A 4A 4A 4A	4Y 4Y 4Y 4Y 4Y 4Y 4Y 4Y	55 55 55 55 55 55 55 55	

11 Same tests, terminal conditions and limits as for subgroup 10, except $T_A = -55^\circ C$.

TABLE III. Group A inspection for device type 05.
Terminal conditions (pins not designated are open)

Subgroup	Symbol	MIL-STD-883 method	Case A,B,D Case C	Test limits																		
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	Meas.	terminal	Min	Max	Unit
$T_A = 25^\circ C$	V_{OL}	3007	1	2.0 v 5.5 v	2 mA	2A	VCC 3A	4.5 v 5.5 v	5.5 v 5.5 v	5.5 v 5.5 v	4A 2 mA	5Y 2.0 v	5A 2 mA	5Y 2 mA	GND GND	6Y 2 mA	6A 1Y	1Y	2Y	2Y	v	
	V_{OH}	3006	2	0.7 v 5.5 v	-100 μ A 0.7 v 5.5 v	5.5 v 5.5 v	0.7 v 5.5 v	0.7 v 5.5 v	0.7 v 5.5 v	0.7 v 5.5 v	-100 μ A 0.7 v 5.5 v	GND GND	6Y 2 mA	2 mA	2 mA	5.5 v	-100 μ A	1Y	2.4			
	I_{OS}	3011	7	0.7 v 5.5 v	-100 μ A 0.7 v 5.5 v	5.5 v 5.5 v	GND GND	5.5 v GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	0.7 v -100 μ A	-100 μ A 0.7 v	GND GND	1Y	-3	-15 mA	
	I_{IH1}	3010	8	2.4 v GND	2.4 v GND	2.4 v GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	2.4 v GND	2.4 v GND	GND GND	2Y	3Y	4Y	
	I_{IH2}	3009	9	2.4 v GND	2.4 v GND	2.4 v GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	GND GND	2.4 v GND	2.4 v GND	GND GND	2Y	3Y	4Y	
	I_{IL}	3005	10	0.3 v 5.5 v	0.3 v 5.5 v	0.3 v 5.5 v	5.5 v GND	5.5 v GND	5.5 v GND	5.5 v GND	5.5 v GND	0.3 v 5.5 v	0.3 v 5.5 v	5.5 v GND	2.4 v GND	1A	100	μ A				
	I_{ICCL}	3005	11	0.3 v 5.5 v	0.3 v 5.5 v	0.3 v 5.5 v	5.5 v GND	5.5 v GND	5.5 v GND	5.5 v GND	5.5 v GND	0.3 v 5.5 v	0.3 v 5.5 v	5.5 v GND	2.4 v GND	1A	100	μ A				
	I_{ICCH}	3005	12	0.3 v 5.5 v	0.3 v 5.5 v	0.3 v 5.5 v	5.5 v GND	5.5 v GND	5.5 v GND	5.5 v GND	5.5 v GND	0.3 v 5.5 v	0.3 v 5.5 v	5.5 v GND	2.4 v GND	1A	100	μ A				
	2		13	Same tests, terminal conditions and limits as for subgroup 1, except $T_A = 125^\circ C$.																		
	3		14	Same tests, terminal conditions and limits as for subgroup 1, except $T_A = -55^\circ C$.																		

TABLE III. Group A inspection for device type 05 - Continued.

Subgroup	Symbol	MIL-STD-883 Method	Case A, B, D	Terminal conditions (pins not designated are open)												Test limits			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14		
9 TA = 25°C	t _{PHL}	3003 (Fig. 5)	Case C	39 CKT A 39 CKT B 40 CKT A 40 CKT B 41 CKT A 41 CKT B 42 CKT A 42 CKT B 43 CKT A 43 CKT B 44 CKT A 44 CKT B	1A 2Y	IN OUT	IN OUT	IN IN	OUT OUT	IN IN	OUT OUT	IN IN	GND GND	5A 6Y	5A 6Y	1Y 1Y	N/A terminal	ns	
	t _{PLH}			45 CKT A 45 CKT B 46 CKT A 46 CKT B 47 CKT A 47 CKT B 48 CKT A 48 CKT B 49 CKT A 49 CKT B 50 CKT A 50 CKT B	IN IN	OUT OUT	IN IN	OUT OUT	IN IN	OUT OUT	IN IN	OUT OUT	OUT OUT	OUT OUT	IN IN	OUT OUT	1A to 1Y 1A to 1Y	60	
	t _{PHL}			51 CKT A 51 CKT B 52 CKT A 52 CKT B 53 CKT A 53 CKT B 54 CKT A 54 CKT B 55 CKT A 55 CKT B 56 CKT A 56 CKT B	IN IN	OUT OUT	IN IN	OUT OUT	IN IN	OUT OUT	IN IN	OUT OUT	OUT OUT	OUT OUT	IN IN	OUT OUT	1A to 1Y 1A to 1Y	90	
	t _{PLH}			57 CKT A 57 CKT B 58 CKT A 58 CKT B 59 CKT A 59 CKT B 60 CKT A 60 CKT B 61 CKT A 61 CKT B 62 CKT A 62 CKT B	IN IN	OUT OUT	IN IN	OUT OUT	IN IN	OUT OUT	IN IN	OUT OUT	IN IN	OUT OUT	OUT OUT	IN IN	OUT OUT	1A to 1Y 1A to 1Y	90

11 Same tests, terminal conditions and limits as for subgroup 10, except TA = -55°C.

TABLE III. Group A inspection for device type 06.
Terminal conditions (pins not designated are open)

TABLE III. Group A inspection for device type 06 - Continued.
Terminal conditions (pins not designated are open)

Subgroup	Symbol	MIL-STD-883 method	Case C	Test limits																
				1	2	3	14	6	4	5	8	9	10	7	12	13	11	Meas. terminal	Min	Max
10	t_{PHL}	3003 (Fig. 6)	1A	1B	1Y	VCC	$\geq Y$	2A	2B	3Y	3A	3B	GND	4A	4B	4Y	1A to 1Y	3	90	ns
			47	IN	2.4 v	OUT	5.0 v	OUT	IN	2.4 v	OUT	IN	2.4 v	IN	2.4 v	OUT	2A to 2Y			
			48														3A to 3Y			
			49														4A to 4Y			
			50														1A to 1Y	140		
	t_{PLH}		51	IN	2.4 v	OUT		OUT	IN	2.4 v	OUT	IN	2.4 v	IN	2.4 v	OUT	2A to 2Y			
			52														3A to 3Y			
			53														4A to 4Y			
			54																	
11	Same tests, terminal conditions and limits as for subgroup 10, except $T_A = -55^\circ C$.																			

5. PREPARATION FOR DELIVERY

5.1 Preservation-packaging and packing. Microcircuits shall be prepared for delivery in accordance with MIL-M-38510.

6. NOTES

6.1 Notes. The notes specified in MIL-M-38510 are applicable to this specification.

6.2 Intended use. Microcircuits conforming to this specification are intended for use for Government microcircuit applications (original equipment) and logistic purposes.

6.3 Ordering data. The contract or order should specify the following:

- (a) Complete part number (see 1.2).
- (b) Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.
- (c) Requirements for certificate of compliance, if applicable.
- (d) Requirements for notification of change of product or process to procuring activity in addition to notification to the qualifying activity, if applicable.
- (e) Requirements for packaging and packing.
- (f) Requirements for failure analysis (including required test condition of Method 5003), corrective action and reporting of results, if applicable.
- (g) Requirements for product assurance options.
- (h) Requirements for carriers, special lead lengths or lead forming, if applicable. These requirements shall not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by, or direct shipment to the Government.

6.4 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-STD-1313, MIL-STD-1331, and as follows:

GND - - - - - Electrical ground (common terminal)
 V_{IN} - - - - - Voltage level at an input terminal

6.5 Logistic support. Lead materials and finishes (see 3.3), are interchangeable. Unless otherwise specified, microcircuits procured for Government logistic support will be procured to device class B (see 1.2.2), lead material and finish C (see 3.3), and case outline A (see 1.2.3). There is no substitute for case outline C. Longer length leads and lead forming shall not affect the part number.

6.6 Substitutability. Microcircuits covered by this specification unilaterally supersede the following commercial device types:

<u>Device type</u>	<u>Commercial type</u>
01	54L30
02	54L20
03	54L10
04	54L00
05	54L04
06	54L03 (case C only) and 54L01 (case A, E, and D)

Custodians:

Army - EL
Navy - EC
Air Force - 17
NASA - NA

Review activities:

Army - MI
Navy -
Air Force - 11, 70, 80
DSA - ES

Preparing activity:

Air Force - 17

Agent:

DSA - ES

(Project 5962-T041)

User activities:

Army - SM, MU, WC
Navy - AS, OS, CG, MC
Air Force - 13, 15, 19